

COPY



November 8, 2016

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PLANNING BOARD
GRAFTON, MA

**Subject: The Village at Institute Road
Definitive Plan Review**

Dear Joe:

We received the following documents in our office October 3, 2016:

- Plans entitled The Village at Institute Road a Conventional Subdivision in Grafton, MA dated September 16, 2016, prepared by Guerriere & Halnon, Inc. for D&F Afonso Builders, Inc. (27 sheets)
- Document entitled Hydrologic & Hydraulic Report "The Village At Institute Road" in Grafton Main, Massachusetts dated September 13, 2016, prepared by Guerriere & Halnon, Inc. for D& F Afonso Builders, Inc.
- Correspondence to the Grafton Planning Board from Guerriere & Halnon, Inc., dated September 29, 2016, regarding The Village at Institute Road Definitive Plan Application with attachments.

Graves Engineering, Inc. (GEI) has been requested to review and comment on the plans' conformance with applicable "Rules and Regulations Governing the Subdivision of Land; Grafton, Massachusetts" revised through April 27, 2009; "Grafton Zoning By-Law" amended through May 9, 2016; Massachusetts Department of Environmental Protection (MADEP) Stormwater Management Policy and standard engineering practice on behalf of the Planning Board. As part of this review, GEI visited the site entrance on April 1, 2016.

Our comments follow:

Subdivision Rules and Regulations

1. One waiver was requested. GEI reviewed the waiver request and the plans; we do not have technical concerns with the request to use low profile "Cape Cod" berm (§4.2.1.2) as long as vertical granite curb is used at the intersection radii and cul-de-sacs (as currently proposed) and as long as granite curb inlets are used at the catch basins (not currently proposed). We understand that the Planning Board will address any waiver requests. If this waiver is to be granted, then the plan-view sheets will need to be revised to show granite curb at the catch basins, the catch basin construction detail will need to be revised to specifically require a granite curb inlet and the "Curb Transition Detail" on Sheet 26 will need to be revised to show a non-chamfered (aka "tip-down") transition curb instead of a chamfered transition.

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2. Sheets 23 and 24 of the plan set must be revised to include north arrow. (§3.3.3.6)
3. Bounds were only proposed along the rights-of-way. The plans must be revised to also include bounds at all angle points along the easements, access routes and open space areas. (§3.3.3.10 & §3.3.3.17 & §4.8.1)
4. Notice of any and all decisions, special permits (i.e. Major Residential Special Permit), etc. must be identified on the plans. (§3.3.3.13)
5. The words "Deeds of Easements to be Recorded Herewith" must be included on each plan sheet. (§3.3.3.15)
6. The plan and profile sheets must be revised to include the existing and proposed elevations shown at every twenty-five (25) foot interval along vertical curves (Sheets 16-19 and 22). (§3.3.3.16.b)
7. The plans must be revised to include profiles of all walkways, specifically the walking paths off of Lot 7, Lot 14, and Lot 39. (§3.3.3.16.c)
8. The regulations require that elevations be based on the National Geodetic Vertical Datum of 1929. The datum used for the project is based on the 1988 N.A.V.D. We don't have an issue with the use of 1988 N.A.V.D. but we defer to the Planning Board whether this is acceptable. (§3.3.3.16.d)
9. The plan sheets must be revised to show the locations (with labels) where the roadway and stormwater basin soil test pits were excavated. (§3.3.3.18.a)
10. The plans must be revised to include a preliminary location for the electric, telephone, and cable lines. GEI understands that this location may change depending upon the utility companies' designs (i.e. NGRID, Charter). (§3.3.3.18.c)
11. GEI has recently been authorized to review and comment on the project's conformance with applicable Conservation Commission "Regulations Governing Stormwater Management" or Conservation Commission "Rules and Regulations for the Administration of the Town of Grafton Local Wetlands Bylaw of 1987". GEI will issue a letter under separate cover. (§3.3.3.19.a & §3.3.3.19.d)
12. The Engineer must provide pipe design flow calculations using the rational method for the 25-year storm event. (Rules and Regulations Governing the Subdivision of Land §3.3.3.19.d & Regulations Governing Stormwater Management §6.B.3.a)
13. The species and location of proposed street trees must be identified on the plans. (§3.3.3.20)
14. The following construction details must be added to the plans: Pavement Markings, Guard Rail, Monument, Roof Drainage Recharge Chambers, Concrete Sidewalk, Cape Cod Berm and Erosion Control Blankets. (§3.3.3.21.b)
15. The Standard Road Cross Section construction detail on Sheet 26 needs to be revised to show the correct concrete sidewalk thickness and to show gravel under

- the sidewalk. The Rules and Regulations Governing the Subdivision of Land require that the concrete sidewalk comply with Massachusetts Highway Department (MHD) specifications (i.e. the concrete sidewalk must be four-inches thick). (§3.3.3.21.b & §5.5)
16. The Subdivision Rules and Regulations require street lights at all intersection and every three hundred (300) feet. The plans currently show street lights at the intersections and cul-de-sacs but not at every three hundred (300) feet. We understand that the applicant will have to coordinate the final street light locations with the Grafton Board of Selectmen. (§4.7.6)
 17. The locations of Catch Basin #15 (Brook Street Sta. 5+50) and Catch Basin #22 (Brook Street Sta. 12+50) as shown on Sheet 14 are located within driveway curb cuts. The Engineer must revise the locations of these driveway curb cuts or catch basins. (§4.7.8.3)
 18. The plans must be revised to show a concrete sidewalk across the driveways. (§4.9.1)
 19. The plans show that Parcel C is dedicated to be an access/walkway path, with a proposed slope of approximately 25%. The slope of the access/walkway path must be revised. The pathway must have a slope equal to or less than eight (8) percent. (§4.10.4)
 20. The Engineer must revise the drainage pipe design to provide at least four (4) feet of cover over all drain pipes or provide Class V RCP pipe on the full length of drain lines that have less than four feet of cover anywhere along the line. Based on the plan and profile sheets, GEI estimated that the drainage pipe has less than four (4) feet of cover at the following locations: Audrina Lane Sta 4+80 to Sta. 8+35; Brook Street Sta. 0+05 to Sta. 0+45 and Sta. 16+60 to Sta. 18+85; Dylan Way Sta. 0+00 to Sta. 2+15. (§5.4.2.2)

Hydrology & Stormwater Management Review

21. The Engineer must revise the runoff curve numbers in the hydrology calculations that model "poor" ground cover (i.e. less than 50% ground cover). All pervious ground cover on the site must be assumed to be in "good" hydrologic condition (greater than 75% ground cover). Furthermore, based upon our visual observations at the site, the site consists of good ground cover. (Rules and Regulations Governing the Subdivision of Land §3.3.3.19.d & Regulations Governing Stormwater Management §6.B.3.j)
22. There is significantly less total land area modeled in the post-development hydrology calculations compared to the pre-development calculations; the difference is 595,700 square feet or approximately 13.7 acres. The total land areas must be consistent unless justified otherwise (e.g. if roof runoff for all storm events is to be collected and infiltrated with no overflow to the ground surface and supporting documentation is submitted to demonstrate such).
23. In the post-development hydrology calculations, Subcatchment DA#3P was modeled with 127,629 square feet (sq. ft.) of impervious area. We estimated a total of

- 226,000 sq. ft. of impervious area in this subcatchment (112,000 sq. ft. for the roads and sidewalks, 80,000 sq. ft. for the house lots and 34,219 sq. ft. of off-site area as modeled in the pre-development hydrology calculations). The amount of impervious area needs to be reviewed by the Engineer and revised as necessary.
24. In the post-development hydrology calculations, Subcatchment DA#3P was modeled as discharging stormwater to the proposed infiltration basin (Pond 5P in the calculations). As delineated, Subcatchment DA#3P contains a significant amount of area that is not tributary to the infiltration basin. The post-development hydrology calculations need to be revised to exclude non-tributary area from the infiltration basin modeling and instead model the non-tributary area as a separate subcatchment.
 25. In the post-development hydrology calculations, the modeling of the infiltration basin (Pond 5P) must include the outlet pipe. The outlet control structure has three inlet orifices in parallel and one outlet pipe in series with the three orifices. As currently configured the outlet pipe appears to be more restrictive to flow than the three orifices.
 26. The Plan View Basin Detail (Sheet 27) shows a 12" orifice at invert elevation 377.5, however in the hydrology calculations this is an 18" orifice. The size of the orifice on the plans must be consistent with the hydrology calculations.
 27. The hydrology computations indicate that Basin #1 would discharge stormwater over the emergency spillway during the 100-year storm. Infiltration basins must be designed so that they do not use the emergency spillway for design storm discharges; the Engineer must revise as necessary.
 28. The exfiltration rate used in the hydrology modeling of Basin #1 must be revised to 1.02 in/hr, the Rawl's rate for sandy loam soils.
 29. The Engineer must revise the Pre-Development Plan and Post-Development Plan for the following reasons: the drainage plans must include the limits of each catchment in their entirety and the areas labeled on the Plans must be consistent with the values used in the hydrology calculations (specifically, the areas listed on the Plans for catchments DA #3E, DA #2P, and DA #3P do not match what was used in the hydrology calculations).
 30. The Engineer must revise the design of the sediment forebay inlet pipe. As currently designed, the inlet pipe is at the bottom of the forebay. As sediment accumulates within the forebay, the inlet could become blocked thus preventing stormwater from entering the sediment forebay. The Engineer must provide enough vertical clearance between the bottom of the forebay and the inlet pipe invert to allow for sediment to accumulate within the forebay. Also, the proposed diverter manhole labels the pipe to the forebay as six-inch diameter pipe and the plan view labels this pipe as an eight-inch diameter pipe. The plans must be revised to show a consistent pipe size.
 31. The Engineer must provide evidence to demonstrate that the proposed diverter manhole was designed to direct the required water quality volume through the forebay. Similarly, calculations must be submitted to model the stormwater flows into

and out of the forebay and to calculate the peak water surface elevations during the two-year through the 100-year storm events.

32. A Stormwater Management Checklist must be provided.
33. The top of the berm for the infiltration basin is proposed to be elevation 381.00 feet. At this elevation, the width of the berm will only be approximately three feet. The top of the berm must be at least ten feet wide to provide reasonable access for maintenance equipment.
34. The Engineer must provide the following calculations: rip-rap apron sizing calculations, Basin #1 drawdown time calculations, required water quality treatment volume calculations and sediment forebay sizing calculations to demonstrate compliance with MassDEP Stormwater Management Standards 1, 3, and 4.
35. The Engineer must revise the Total Suspended Solids (TSS) worksheet. The calculations cannot use a TSS removal credit for the second sediment forebay unless this forebay has been adequately sized. Second, the eighty percent TSS removal credit includes adequate pretreatment (i.e. the forebay up-gradient of the infiltration basin). As such, together the first forebay and the infiltration basin provide eighty percent TSS removal.

General Engineering Comments

36. The plans show a sidewalk beginning at the intersection of Audrina Lane and Institute Road, extending southerly along Institute Road and terminating north of the existing vernal pool. Consideration should be given to extending the sidewalk southerly along Institute Road from the currently proposed terminus to the intersection of Brooke Street to provide pedestrian access along Institute Road. Use of this section of Institute Road by pedestrians will be inevitable once the project is developed. In our opinion, the width of the pavement on Institute Road and the horizontal alignment of the road warrant that pedestrians should be separated from vehicular traffic. Please refer to Condition C6a of the Decision for Major Residential Permit MSRP 2014-10.
37. Per standard practices, drainage pipes must be designed to have velocities that do not exceed ten (10) to twelve (12) feet per second (fps) when flowing full. The following drain pipes as currently designed will have velocities that exceed twelve (12) fps: the eighteen-inch pipe from DMH#11 to DMH#12; the thirty-six-inch pipe from DMH#16 to the diverter manhole; the thirty-six-inch pipe from the diverter manhole to the infiltration basin's inlet; and the thirty-six-inch pipe from the infiltration basin's outlet control structure to the headwall (which we recommend should have a velocity no greater than 10 fps because it's located at the discharge point). Also, Grafton's Regulations Governing Stormwater Management limit the velocity to a maximum of 10 fps.
38. The Engineer must match either the pipe crown elevations or 0.8 pipe diameter elevations at manholes with changes in pipe diameter (unless a drop manhole is proposed, in which case the incoming pipes would be higher). For example, pipe inverts at DMH #4, DMH #8, and DMH #12 must be revised.

39. The location of the outlet structure must be revised. According to the Plan View Basin Detail and the hydrology calculations, the inlet openings will be below the ground surface, preventing stormwater from draining out of the basin.
40. Proposed Basin #1 does not appear to have any security or safety measures encompassing it. We defer to the Town of Grafton if it desires a fence around the basin. If a fence is desired, then a four-foot high fence should be considered. The Chain Link Fence construction detail on Sheet 26 shows a six-foot high fence, but the plans don't show where a fence is proposed.
41. The "Typ. Precast Concrete Manhole Sanitary" construction detail on Sheet 26 must be revised to comply with the Town's standards. We understand that the frame must be EJIW Model No. 2007Z and the cover must be EJIW Model No. 2006A. The manhole must have a thirty (30) inch opening. If not already done, the Engineer should solicit input from the Grafton Sewer Department.
42. The "Catch Basin" construction detail on Sheet 27 must be revised to comply with the Town's standards. We understand that the frame must be EJIW Model No. 5520Z, the grate must be EJIW Model No. 5520MB, and the catch basin hood must be an "Eliminator".
43. The "Precast Concrete Drain Manhole" construction detail on Sheet 27 must be revised to comply with the Town's standards. We understand that the frame must be EJIW Model No. 2114Z and the cover must be EJIW Model No. 2110A.
44. The "Typ. Double Grate Catch Basin" construction detail on Sheet 27 must be revised to comply with the Town's standards. We understand that the frame must be EJIW Model No. 5448Z and the cover must be EJIW Model No. 5520M5.
45. Sheet 26 shows two (2) PVC Pipe Trench Section construction details. The Engineer must either remove one of the construction detail if it is superfluous or revise the construction details to indicate to what each construction detail applies.
46. Sheet 3 shows a utility and snow easement on Lot 39, however this easement is not shown on Sheets 14 and 19; the plans must be revised to show all of the easements.
47. The "Ductile Iron Pipe Trench Section" construction detail on Sheet 26 shows five (5) feet minimum cover between the top of the pipe and finished grade. Based on the plan and profile sheets, GEI estimated that the ductile iron water main does not have five feet of cover at the following locations: Brooke Street Sta. 4+28 to Sta. 12+30 and Sta. 13+00 to Sta. 19+00; and Dylan Way. The plan and profile sheets need to be revised to provide five feet of cover or the Grafton Water District (GWD) needs to be consulted relative to cover less than five feet.
48. Sheet 27 shows an illegible "Street Light Detail"; the Engineer must revise this construction detail. Also a construction detail for the luminaires needs to be provided. The engineer must coordinate the proposed pole and luminaires with the Grafton Department of Public Works.
49. The Engineer must revise the sewer and/or drain design following the reasons: on Sheet 17 there is a conflict or near conflict between CB#29 and the eighteen-inch

reinforced concrete drain pipe; and on Sheet 18 there is a conflict or near conflict between CB#26 and the eight-inch polyvinyl chloride sewer pipe.

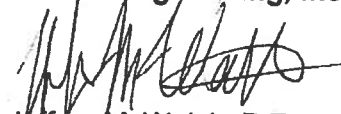
50. The Engineer must revise Sheet 23. There are two "26' " dimensions in the road that aren't needed as there is no gravel should on the west side of Institute Road.
51. The Engineer must revise the eighteen (18) inch drain pipe shown on the profile view of Sheet 17. The drain pipe is not drawn to the right scale between DMH #8 and DMH#10.
52. On Sheet 23, STOP and STOP AHEAD signs need to be added in accordance with the last paragraph of Greeman-Pedersen Inc.'s correspondence dated September 16, 2016.

General Comments

53. Sheet 8 must be revised to include the utility easement designated for the proposed sewer pump station.
54. Prior to the plan endorsement, all sheets of the plan set, including the cover sheet, must include the statement "See Sheet ____ for Planning Board Conditions of Approval", and the conditions must be inscribed on said sheet.
55. Sheet 19 must be revised to identify the road labeled as Road "C" as Dylan Way to be consistent with the other plan sheets.
56. On Sheet 9, Lot #14 was inadvertently labeled "Lot #13".
57. On Sheet 24, Note 18 references "Bellingham" and Note 21 references "Ashland". On Sheet 27 the "Precast Concrete Manhole Detail" references "M.D.P.W". The Engineer must remove all references to Towns and DPW's other than Grafton.
58. GEI did not review the design of the sewer pump station or the sewer main design. We understand that the Grafton Sewer Commission will review the subdivision's sewer design.
59. GEI has not reviewed the plans with respect to the water main design. We understand that the Grafton Water District will review the subdivision's water design.

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,
Graves Engineering, Inc.



Jeffrey M. Walsh, P.E.
Vice President

cc: Normand Gamache, Jr.; Guerriere & Halnon, Inc.

